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CONTACT INFORMATION
Condensed Matter Physics and Material Science Division,
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CITIZENSHIP: British

RESEARCH INTERESTS

Condensed matter theory: strongly correlated quantum systems

- ♢ Field theories of low-dimensional strongly correlated systems
- ♢ Dynamics of integrable quantum systems
- ♢ Non-equilibrium dynamics of weakly non-integrable systems
- ♢ Entanglement entropies in field theories
- ♢ Development and application of many-body techniques:
  conformal field theory, bosonization, DMRG, truncated spectrum methods,
  exact diagonalization, equations of motion, bootstrapping from integrability

EMPLOYMENT

Research Associate (2014–present) **Brookhaven National Laboratory (BNL)**
SUPERVISED BY: Dr. Robert Konik.
PUBLICATIONS:
Two letters in Physical Review Letters
One article in Physical Review B
One review article to appear in Reports in Progress in Physics
One article under review in Physical Review A
Two manuscripts in preparation
AWARDS:
2016 BNL Spotlight Award for Exceptional Performance

EDUCATION

DPhil Theoretical Physics (2010–2014) **Jesus College, University of Oxford**
THESIS: *Pairing, Paramagnetism and Prethermalization in Strongly Correlated Low-Dimensional Quantum Systems*
SUPERVISED BY: Prof. Fabian Essler.
EXAMINED BY: Prof. Giuseppe Mussardo and Prof. Steven H. Simon.
PUBLICATIONS:
Three articles in Physical Review B
AWARDS:
Joint first in class in Numerical Methods I

MPhys Physics (First class with honours, 2006–2010) **University of Exeter**
DISSERTATION: *Confinement of zero-energy electrons in graphene*
SUPERVISED BY: Prof. Misha Portnoi.
PUBLICATIONS:
One article in Physical Review B
AWARDS:
National Physical Laboratory SET Award for the Best Physics Student.
Israel B. Black Award for top physics student in final year examinations.
Newman Prize for most innovative dissertation project.
Commendation from the Dean of Undergraduate Studies (2007–2010).
School of Physics prize for top candidate in examinations (2007–2010).
Millhayes Academic Scholarship (2006–2010).

Professional Service

Referee for Physical Review Letters, Physical Review X, and Physical Review B.
Theory representative on the BNL CMPMS Seminar Committee, 2015-present.
Executive board member, Brookhaven Women in Science (501(c)3 charity), 2015-present.
Advisor to the board, BNL Association of Students and Postdocs, 2016.
Board member, BNL Association of Students and Postdocs, 2015.
University of Oxford Theoretical Physics Computing Committee, 2013–2014.

Conference Organization

Organization committee member, Early Career Research Symposium, BNL 2016.
Organizer and session chair, APS Author and Referee Tutorial, BNL 2016.
Presentations committee chair, Young Researchers Symposium, BNL 2015.

Outreach Activities

Assistant, MoMath scientific computing for high school students, BNL 2016/17.
Scientist at 'Meet A Scientist' high school careers event, BNL 2016.
Moderator, Long Island Regional Middle School Science Bowl 2016.
Judge, New York State Science Congress High School Science Fair 2015.
Judge, Long Island Regional Elementary School Science Fair 2015.
Moderator, Long Island Regional High School Science Bowl 2015.

Invited Talks

Non-equilibrium dynamics of isolated low-dimensional quantum systems, BNL Condensed Matter Theory Seminar, October 2015.
Prethermalization and thermalization in models with weak integrability breaking, Beyond Integrability Workshop, CRM Montréal, July 2015.
Umklapp scattering in doped two-leg ladders, Quantum Interacting Systems Group Seminar, University of Exeter, November 2012.
Finite wave vector pairing in doped two-leg ladders, Condensed Matter Theory Group Seminar, Oxford, November 2012.
Umklapp scattering in doped two-leg ladders, Cafe Scientifique, University of Oxford, October 2012.

Contributed Talks and Seminars

Understanding zero energy modes in SU(2) Heisenberg spin ladders from a field theory perspective, APS March Meeting, Baltimore MD, March 2016.
Non-equilibrium dynamics of an impurity in the one dimensional Bose gas, APS March Meeting, San Antonio TX, March 2015.
Two results due to Rudolf Peierls, Journal Club, Oxford, October 2013.
Luttinger's Theorem, Journal Club, Oxford, November 2012.
Umklapp scattering in doped two-leg ladders, Quantum Correlations Students Workshop, University of Nottingham, July 2012.

Teaching

Problems Class Tutor: Theoretical Physics (2011-2013, 6 terms, 10-14 students)
Topics: Many-body quantum mechanics, classical and quantum field theory, statistical mechanics, stochastic processes, phase transitions and critical phenomena.

Recent Collaborators

B. Bertini (SISSA), J.-S. Caux (Amsterdam), F. H. L. Essler (Oxford), A. J. A. James (UCL), V. Oganesyan (CUNY), T. Pálmai (BNL), J. D. Rameau (BNL), D. Schuricht (Utrecht), Z. Zimborás (Freie Universität Berlin)

Computing

Operating Systems: Mac OSX, Unix, Windows
Languages: C++, C, Python, LaTeX, Matlab, Mathematica
Libraries: OpenMP, LAPACK, BLAS, ALPS, iTensor

Publications

1. *Smooth electron waveguides in graphene*,
   R. R. Hartmann, N. J. Robinson, and M. E. Portnoi,
   Phys. Rev. B **81**, 245431 (2010).

2. *Finite wave vector pairing in doped two-leg ladders*,
   N. J. Robinson, F. H. L. Essler, E. Jeckelmann and A. M. Tsvelik,
   Phys. Rev. B **85**, 195103 (2012).

3. *Quasiparticle breakdown in the quasi-one-dimensional Ising ferromagnet* $CoNb_2O_6$,
   N. J. Robinson, F. H. L. Essler, I. Cabrera and R. Coldea,
   Phys. Rev. B **90**, 174406 (2014).

4. *Quench dynamics in a model with tunable integrability breaking*,
   F. H. L. Essler, S. Kehrein, S. Manmana and N. J. Robinson,
   Phys. Rev. B **89**, 165104 (2014).

5. *Prethermalization and thermalization in models with weak integrability breaking*,
   B. Bertini, F. H. L. Essler, S. Groha and N. J. Robinson,
   Phys. Rev. Lett. **115**, 180601 (2015).

6. *Motion of a distinguishable impurity in the Bose gas: arrested expansion without a lattice and impurity snaking*,
   N. J. Robinson, J.-S. Caux and R. M. Konik,
   Phys. Rev. Lett. **116** 145302 (2016).

7. *Thermalization and light-cones in a model with weak integrability breaking*,
   B. Bertini, F. H. L. Essler, S. Groha and N. J. Robinson,
   arXiv:1608.01664 (2016), accepted to Phys. Rev. B.

8. *Exact nonequilibrium dynamics of a class of initial states in one-dimensional two-component quantum gases*,
   N. J. Robinson, J.-S. Caux and R. M. Konik,
   arXiv:1602.05532 (2016), submitted to Phys. Rev. A.

9. *Excitations in the Yang-Gaudin Bose gas*,
   N. J. Robinson and R. M. Konik,
   in preparation (2016).

10. *New developments in the theoretical treatment of low-dimensional strongly-correlated systems*,
    A. J. A. James, R. M. Konik, P. Lecheminant, N. J. Robinson and A. M. Tsvelik,
    to appear in Reports on Progress in Physics, December 2016.

11. *Conditions for the appearance of boundary modes in topological phases of Heisenberg spin ladders*,
    N. J. Robinson, A. Altland, R. Egger, N. Gergas, W. Li, D. Schuricht, A. M. Tsvelik, A. Weichselbaum and R. M. Konik,
    in preparation (2016).